6. (ONCE AMENDED) The joint structure of a robot according to claim 5, wherein the input gear meshes with the spur gear and is connected to the shaft of the motor.

Please **ADD** new claims 10 and 11 as follows:

10. (NEW) The joint structure of a robot according to claim 5, wherein the crank shaft does not revolve around the input gear.

11. (NEW) The joint structure of a robot according to claim 5, wherein the crank shaft is spaced inward in a radial direction of the joint structure with respect to the motor shaft.

REMARKS

INTRODUCTION:

In accordance with the foregoing, claims 1, 4, 5 and 6 have been amended. Claims 10 and 11 have been added. Claims 1-11 are pending and under consideration.

REJECTIONS UNDER 35 U.S.C. §102:

Claims 5-8 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent 4,690,010 to Matsumoto et al.

Independent claim 5 recites "a crank shaft spaced with respect to a center of rotation of the speed reducer." These features are shown, for example, in present FIG. 1, which illustrates the crank shaft 16 and the first and second members 11, 12 of the speed reducer. This spacing is achieved because the rotating member 21 supports the crankshaft 16 for rotation and rotates about the central axis of the internal gear 19, the second member 12 is attached to the rotating member 21, and the motor 13 is attached to the second member 12. Thus, the motor 13 is attached (through the second member 12) to the rotating member 21, which supports the

crankshaft 16 for rotation to rotate about the central axis of the internal gear 19.

In contrast, in Matsumoto et al., the pinion 22 (and the drive shaft 7 of the motor 2) is located at the center of the speed reducer, and the eccentric input shaft 30 revolves around the pinion 22. Matsumoto et al., FIG. 9.

The electric motor 2 is mounted on the first robot member 71 through the cylindrical support member 4 (column 11, lines 9-13), and the internal gear 28 is mounted on the cylindrical support member 4 (column 11, lines 18-19). Therefore, the internal gear 28 is provided on the first robot member 71.

Further, the eccentric input shaft 30 is supported by the circular plate 33, and the block member 72 is interposed between the circular plate 33 and the second robot member 73 (column 11, lines 22-26). Carrier means 76 including the circular plate 33 and the block member 72 are connected to the second robot member 73.

Then, when the second robot member 73 rotates with respect to the first robot member 71, the eccentric input shaft 30 revolves, in association with the rotation of the second robot member 73, about the center axis or around the axis of the drive shaft 7. That is, the input gear 22 is located at the center of the relative rotation of the second robot member 72, and the eccentric input shaft 30 revolves around the input gear 22.

In the case of Matsumoto et al., the member which supports the eccentric shaft 30 for rotation and rotates about the central axis of the internal gear 28 is the second robot member 73. However, the motor 2 of Matsumoto et al. is not mounted on such member 73 which supports the eccentric input shaft. Instead, motor 2 is mounted on the member 71 which has an internal gear 28.

Accordingly, withdrawal of the rejection of claim 5, and claims 6-8 depending therefrom, is requested.

REJECTIONS UNDER 35 U.S.C. §103:

Claims 1-4 and 9 are rejected under 35 U.S.C. §103(a) as being unpatentable over Matsumoto et al. in view of U.S. Patent 5,606,235 to Mauletti.

Independent claim 1 recites that the input gear is "spaced from a center of rotation of the speed reducer."

Accordingly, claim 1, and claims 2-3 depending therefrom, are patentably distinguishable

over Matsumoto et al. for at least the above reasons. Mauletti does not overcome these deficiencies, and is not relied upon by the Examiner for this purpose.

Furthermore, it is noted that dependent claim 3 recites "said casing and said rotating member are provided with through holes about a common axis." Mauletti does not disclose through holes about a common axis. Instead, FIG. 7 of this reference illustrates shafts 35, 50 with hollows therein to allow for passage of cables. However, FIG. 7 clearly illustrates that these shafts do not have a common axis. Accordingly, withdrawal of the rejection of claim 3 is requested.

Independent claim 4 is patentable over the cited references for similar reasons. Claim 9 depends from independent claim 5, and therefore is distinguishable from Matsumoto et al. for at least the above reasons. It is respectfully submitted that Mauletti et al. does not overcome the deficiencies in Matsumoto et al.

NEW CLAIMS:

Claim 10 is added and depends from independent claim 5. This claim recites "the crank shaft does not revolve around the input gear." It is respectfully submitted that Matsumoto et al. teaches that the eccentric input shaft 30 revolves around the pinion gear 22 and thus does not disclose this feature. Mauletti does not overcome this deficiency in Matsumoto et al.

Claim 11 is added and depends from independent claim 5. Accordingly, this claim is patentable over the cited references at least due to its dependency from claim 5.

CONCLUSION:

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters. If there are any monetary deficiencies associated with the filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: 4-30-03

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please **AMEND** claims 1, 4, 5 and 6 as follows. The remaining claims are reprinted for the Examiner's convenience.

1. (TWICE AMENDED) A joint structure of a robot, comprising:

a speed reducer;

a first member;

a second member connected to the first member through the speed reducer to rotate relative to the first member; and

a motor having a shaft, the motor to drive the second member to rotate relative to the first member, wherein

the speed reducer includes a first-stage speed reducing mechanism and a second-stage speed reducing mechanism,

the first-stage speed reducing mechanism includes an input gear connected directly to the shaft of the motor and spaced from a center of rotation of the speed reducer, a single spur gear in mesh with the input gear,

the second-stage speed reducing mechanism includes a crankshaft connected directly to the spur gear, an external gear which engages the crankshaft to be rocked eccentrically, a casing of the speed reducer, an internal gear which is formed inside the casing and is in mesh with the external gear, and a rotating member which supports the crankshaft for rotation and can rotate around the central axis of the internal gear with respect to the casing,

the casing of the second-stage speed reducing mechanism is attached to the first member,

the second member is attached to the rotating member of the second-stage speed reducing mechanism, and

the motor is attached to the second member, with the shaft of the motor shifted with respect to [a] the center rotation of the speed reducer, so that the input gear of the motor is in mesh with the spur gear of the first-stage speed reducing mechanism.

2. (ONCE AMENDED) The joint structure of a robot according to claim 1, wherein said second member comprises a mounting portion to mount the motor in a given position and is attached to the rotating member axis of the output of the speed reducer, and said second member and said rotating member are configured such that the rotational phase of the second member are configured such that the rotational phase of the second member with respect to the rotating member is settled using a positioning pin when attaching the second member to the rotating member.

3. (THREE TIMES AMENDED) The joint structure of a robot according to claim 1, further comprising wiring or piping, wherein said first and second members of the robot have a hollow structure inside, and said casing and said rotating member are provided with through holes around a common axis so that the wiring or piping is secured inside the joint.

4. (ONCE AMENDED) A joint structure of a robot, comprising:

a speed reducer comprising:

a cylindrical casing,

a rotating member rotatably supported on the casing through a first bearing and having a hollow in the center thereof, and

a gear speed reducing mechanism arranged on the casing for rotation through a second bearing and having a hollow in the center thereof;

a first member fixed to the casing of the speed reducer and having a hollow in the center thereof;

a second member fixed to the rotating member of the speed reducer and having a hollow in the center thereof; and

a motor fixed to the second member so that the output shaft thereof extends in the direction parallel to the central axis of the speed reducer toward the gear speed reducing mechanism of the speed reducer, the motor having a shaft which is shifted with respect to a center of the speed reducer;

wherein a robot joint is constituted between the first member and the second member in a manner such that the gear speed reducing mechanism of the speed reducer is actuated by the rotation respect to the first member.

5. (ONCE AMENDED) A joint structure of a robot, comprising:

a speed reducer comprising a single spur gear, an input gear to drive the spur gear, and a crank shaft attached to the spur gear and spaced with respect to a center of rotation of the speed reducer;

a first member;

a second member connected to the first member through the speed reducer to rotate relative to the first member; and

a motor having a shaft to drive the input gear connected to the second member to drive the second member.

6. (ONCE AMENDED) The joint structure of a robot according to claim 5, wherein the [motor comprises a shaft, and the speed reducer further comprises an] input gear [to mesh] meshes with the spur gear and is connected to the shaft of the motor.

7. (NEW) The joint structure of a robot according to claim 6, wherein the speed reducer further comprises:

a casing attached to the first member; and

a rotating member attached to the second member.

8. (NEW) The joint structure of a robot according to claim 7, further comprising wiring or piping, wherein the casing and the rotating member define through holes therein about a common axis, and the wiring or piping passes through the through holes.

9. (NEW) The joint structure of a robot according to claim 8, wherein the motor is connected eccentrically to the second member to allow the wiring or piping to pass through the through holes.

10. (NEW) The joint structure of a robot according to claim 5, wherein the crank shaft does not revolve around the input gear.

11. (NEW) The joint structure of a robot according to claim 5, wherein the crank shaft is spaced inward in a radial direction of the joint structure with respect to the motor shaft.